REMARKS

Upon entry of the present Preliminary Amendment-A the claims in the application are claims in the application are claims 1, 3-10 and 12-20, of which claim 1 is independent.

Claim 1 is amended to incorporate the limitation of claim 2 (now cancelled) that tin oxide layer has a rutile structure, while claims 10 and 13 are amended to more particularly point out and distinctly claim the subject matter which applicant regards as the invention specifically in regards to the location of the thin metal (mirror) film on either surface of the substrate.

Applicant respectfully submits that all of the above amendments are fully supported by the original application, particularly original claim 2 and the discussion at page 6, lines 8-11, and that no new matter is introduced by the amendment. Applicant also respectfully submits the amendment does not raise any new issue for consideration by the Examiner in that the amendment to claim 1 simply incorporates the limitation of claim 2, while the amendments to claims 10 and 13 clarify the location of the thin metal mirror film consistent with the disclosure in the original specification in response to the Examiner's rejection of claim 13.

Still further, applicant respectfully submits that the above amendment to claim 13 overcomes the Examiner's rejection under 35 USC 112, first paragraph, presented at item 2 of the Office Action, and it is respectfully requested that such rejection be reconsidered and withdrawn.

Art-Based Under 35 USC 103(a)

The Examiner has rejected of claims 1-7 and 9, 10, 12 and 14-20 under 35 USC '103(a) as being unpatentable over Tada et al. (US Patent 6,379,776) in view of Komatsu et al. (US Patent 5,854,708), presented at item 4 of the Office Action, and The Examiner has also rejected claim 8

under 35 USC '103(a) as being unpatentable over the Tada and Komatsu references as applied above and further in view of Ando et al. (US Patent 5,605,609), presented at item 5 of the Office Action. It is the Examiner's position (as essentially maintained from the prior Office Action) that: Tada discloses most of the features of the claimed invention in relation to his nonfogging and stain proof glass articles, except that Tada's articles use titanium dioxide rather than tin oxide as a photocatalytic layer, his article is not disclosed as being a mirror, he does not disclose the claimed thickness range for the SiO_2 overcoat layer, and he does not disclose an overcoat layer comprising silicon and tin; it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use tin oxide as the photocatalyst layer of Tada because it is functionally equivalent to TiO_2 because both materials function as photocatalysts, as taught by Komatsu; it would have also been obvious to one having ordinary skill in the art at the time of the invention was made to apply Tada's teachings to a mirror based on the teachings of Komatsu; while Tada does not disclose a specific thickness range for the SiO_2 overcoat layer, the claimed thickness range would have been obvious as a matter of discovering an optimum value of a result effective variable using routine skill, and also based on the teaching of Komatsu regarding the thickness of his porous, hydrophilic overcoat layer; and it would have also been obvious to substitute in Tada an alkali barrier oxide film containing both silicon and tin based on Ando's teachings.

Applicant's Response

Upon careful consideration and in light of the above amendment to claim 1, applicant respectfully traverses such rejection, and submits that each of present claims 1, 3-10 and 12-20 is clearly patentably distinct over the Tada, Komatsu and Ando references, based on the following.

Initially, applicant again respectfully submits that the presently claimed invention is not disclosed or suggested by the applied references, and achieves a significant advantage which is not achieved or suggested by the applied references, i.e., improved, long-term hydrophilic properties. Particularly, according to amended claim 1, an overcoat layer is formed on the surface of a tin oxide layer, the overcoat layer is made from a material having an *opposite polarity* with respect to tin oxide from the aspect of surface polarity, and the tin oxide layer has a rutile structure which gives it preferable irregularities that transfer through to the overcoat layer giving it a favorable surface roughness. Such combination of the tin oxide layer with a rutile structure (which achieves the desirable surface irregularities without any special processing) and the overcoat with opposite polarity and the favorable surface roughness improves the surface and hydrophilic properties of the tin oxide layer, and it becomes possible to obtain long-term stability of the hydrophilic properties.

In this regard, it should be noted that the rutile structure of the tin oxide makes it possible to easily form a polycrystalline film having a surface of preferable irregularities, that SnO_2 shows little photocatalytic properties as practical matter, and that rutile titanium dioxide is recognized as having *inferior* photocatalytic properties in comparison to anatase titanium dioxide.

From the viewpoint of only surface irregularities, it would seem that the tin oxide layer could achieve long term stability of the hydrophilic properties. However, since the surface of the tin oxide layer is electropositive, the anionic soap easily adheres thereto. Specifically, the anionic soap adheres to the tin oxide layer with the negative portion (= the hydrophilic portion) of the anionic soap is attracted to the tin oxide layer, and the hydrophobic portion of the anionic soap is exposed on the surface. As a result of this, it is difficult to keep the stability of the

hydrophilic properties for a long period of time using just the tin oxide layer.

Thus according to the present invention, by forming the overcoat layer which of a material having an opposite polarity with respect to tin oxide from the aspect of surface polarity, on the surface of the tin oxide layer, it becomes possible to obtain greater, long-term stability of the hydrophilic properties. In this regard, please refer to the Exhibit attached hereto, including a chart and a graph comparing hydrophilic glass according to the invention with other glass samples, particularly relating to the change of contact angle after soap washing. As is readily apparent the change of contact angle with the two examples according to the invention is much less overall, as well as in rate of change, in comparison to the other glass samples.

Such aspect of the invention is not achieved or suggested by Tada , who applies a silicon oxide monocomponent equivalent layer or similar layer over TiO_2 to prevent organic substances from being adhered to the TiO_2 layer because the silicon oxide monocomponent equivalent layer or similar layer "... are nonpolar or has low polarity...." According to Tada's disclosure, the non-fogging articles comprise a glass substrate (structure) / alkali shut-off film / photocatalytic film / silicon dioxide, with a surface roughness (Ra) of 1.5 – 80 nm, a mean interval (Sm) of irregularities at 4 -300 nm, and a photocatalytic layer thickness of 10 -500 nm. Significantly, Tada does not indicate SnO_2 as a photocatalyst, and moreover, Tada discloses that the surface irregularities of his photocatalytic film are achieved either by transfer through of the surface irregularities of the alkali shut-off film or by directly forming irregularities on the photocatalytic film surface, contrary to the claimed invention.

Similarly, the above aspects of the present invention are not achieved or suggested by Komatsu, who coats a glass substrate/structure with a transparent photocatalytic layer and applies

a porous covering layer (i.e., a porous, 150Å layer of SiO_2) over the photocatalytic layer such that the pores function as capillaries to improve the wetting property of an object's surface. While Komatsu discusses several photocatalytic materials including SnO_2, again, it is well known that SnO_2 shows little photocatalytic properties as a practical matter, and Komatsu never discusses use of rutile SnO_2 as a photocatalytic film. If tin oxide is in a conventional amorphous form, it is very difficult to form desirable surface irregularities.

Relatedly, applicant respectfully submits that persons of ordinary skill in the art would not consider it obvious to hypothetically modify Tada's antifogging articles by replacing the TiO_2 photocatalytic layer with a layer of SnO_2 based on the teachings of Komatsu, as proposed by the Examiner, because SnO_2 is recognized as having inferior photocatalytic properties to TiO_2, and because the porous nature of Komatsu's covering layer is contrary to Tada's silicon oxide monocomponent equivalent layer in that Tada teaches against an arithmetical mean roughness (Ra) exceeding 80 nm.

Still further, applicant respectfully submits that even if the Tada and Komatsu references were hypothetically combined, any combination resulting from the full, fair teachings of these references would not achieve or make obvious several important features of the claimed invention. As discussed above, both Tada and Komatsu fail to disclose or suggest important aspects of the invention as set forth in amended claim1, including the tin oxide having a rutile structure and the overcoat layer having a surface polarity opposite to that of tin oxide, and these references also fail to achieve or suggest the significant advantage achieved by the claimed invention.

Additionally, applicant respectfully submits that the applied references do not disclose the

feature of claim 7 regarding the refractive indexes of the undercoat film, the substrate and the tin oxide layer, whereas this feature is particularly advantageous for purposes of improved transparency - appearance, as discussed at page 8 of the present specification. It is noted that the Examiner does not specifically address this feature.

Finally, applicant respectfully submits that Ando's disclosure does not overcome the basic deficiencies of Tada and Komatsu as discussed above.

Based on the foregoing, applicant respectfully submits that the rejections of claims 1-10, 12 and 14-20 under 35 USC '103(a) based on the Tada et al., Komatsu et al. And Ando et al. references are overcome, and accordingly it is respectfully requested that such rejections be reconsidered and withdrawn.

Conclusion

In conclusion, applicant has overcome the Examiner's objections and rejections set forth in the Office Action, and moreover, applicant respectfully submits that the application is now in condition for allowance, and a notice to that effect is earnestly solicited.

Entry of the present Amendment-C is respectfully requested under 37 CFR 1.116 on the grounds that: the Amendment does not raise any new issues for consideration by the Examiner; the Amendment reduces the number of issues on appeal, if necessary; and moreover, the Amendment is believed to place the application in condition for allowance.

If the Examiner is not fully convinced of the patentability of the presently claimed invention in light of the above arguments, applicant respectfully requests that the Examiner telephonically applicant's undersigned representative to discuss the Examiner's concerns, in an effort to expedite prosecution of the application.

A Petition for Two-Month Extension is being filed concurrently herewith.

Favorable reconsideration is respectfully requested.

Respectfully submitted,

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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted via facsimile transmission to the US Patent & Trademark Office, Art Unit 1775, on April 25, 2003.

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JPC/ms
enclosures

omparison of Hydrophilic glass (Embodiment) and other glass (Comparative example) with respect to change of contact angle

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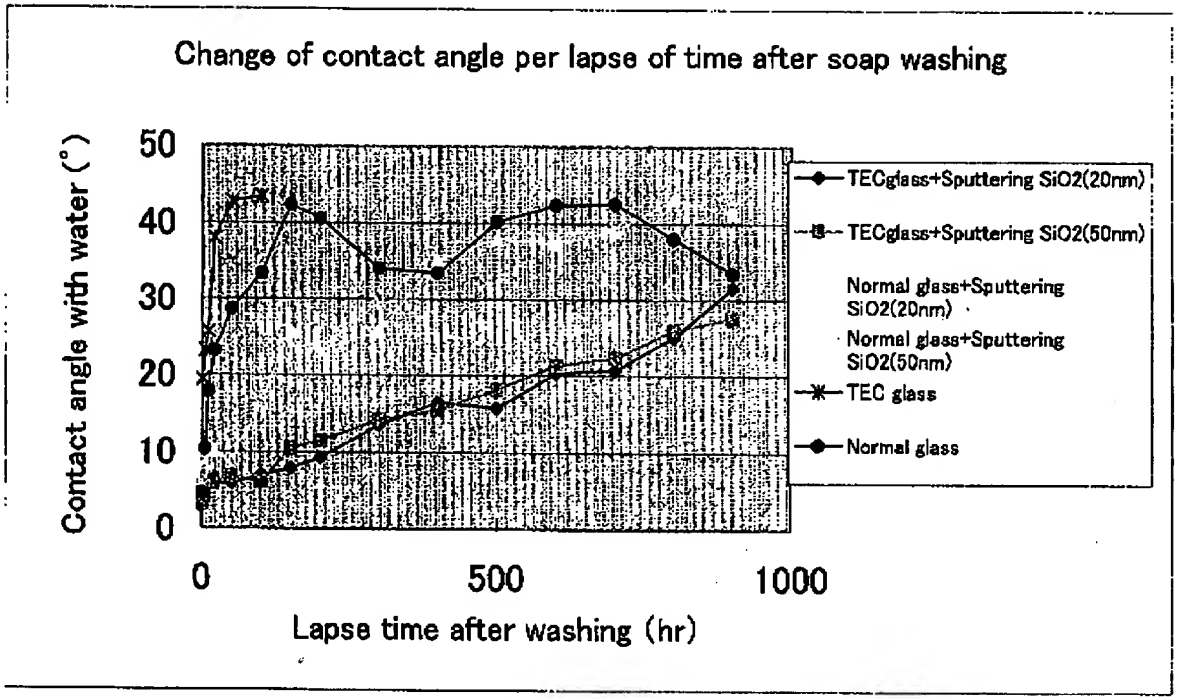
ECglass+Sputtering SiO_2(50nm)	3.2	4.2	6.1	6.3	6.8	8.1	10.5	11.5	14.3	15.5	18.2	21.3	22.3	25.9	27.5
ormal glass+Sputtering SiO_2(20nm)	5.6	8.5	8.8	10.1	8.8	16.6	25.7	23.2	25.7	35.1	38	37.4	39.1	43.2	41.3
ormal glass+Sputtering SiO_2(50nm)	5.5	6.7	8.6	9.5	8.7	16.4	23.8	23.3	29.5	36.7	39.5	38.4	39.4	39	42.3
EC glass	19.4	23.2	25.6	38	42.8	43.5									
ormal glass	4.7	10.4	17.9	23.1	28.6	33.4	42.4	40.6	34	33.4	40.2	42.4	42.6	38	33.4



EXHIBIT